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Ms. Elizabeth Cotsworth, Director
Office of Radiation and Indoor Air
United States Environmental Protection Agency
Mail Code: 6601J
1200 Pennsylvania Avenue, NW
Washington, DC 20460

CERTIFIED MAIL
7006 2150 0002 7438 4043

Ms. Cheryl Newton, Acting Director
Air and Radiation Division
United States Environmental Protection Agency, Region 5
77 West Jackson Blvd.
Mail Code: A-18J
Chicago, Illinois 60604-3507

CERTIFIED MAIL
7006 2150 0002 7438 4050

Dear Sir or Madam:

United States Enrichment Corporation's Portsmouth Gaseous Diffusion Plant's National Emission Standards For Hazardous Air Pollutants (NESHAP) Radionuclide Emissions Report For Calendar Year 2007

Enclosed is a certified copy of the annual NESHAP report required under 40 CFR 61.94 for airborne emissions of radionuclides from the Portsmouth Gaseous Diffusion Plant (PORTS) during calendar year 2007. The PORTS site has operations conducted by two separate entities; the Department of Energy (DOE) performs Environmental Restoration Activities and Waste Handling Activities while the United States Enrichment Corporation (USEC) uses leased site facilities to remove technetium from off-specification UF_6 and maintains the site's gaseous diffusion and support equipment under contract with the DOE. In addition, USEC's parent company, USEC, Inc., is operating the American Centrifuge Lead Cascade and is building the commercial American Centrifuge Plant on-site. This report addresses the emissions from all USEC operations and also includes the total dose value associated with DOE operations conducted at PORTS. The combined dose to the most exposed individual resulting from both USEC and DOE operations was 0.0051 millirem (mrem) for 2007, which is below the standard of 10 mrem per year.

United States Enrichment Corporation
Portsmouth Gaseous Diffusion Plant, P.O. Box 628, Piketon, OH 45661
Telephone 740-897-2331 Fax 740-897-2909 http://www.usec.com

This report includes both the PORTS Gaseous Diffusion Plant and the American Centrifuge Lead Cascade, located at PORTS. The senior corporate official for each facility has certified this report as it relates to his facility only.

If you have any questions or require additional information, please contact Pamela J Potter at (740) 897-4051.

Sincerely,

Robert W. Jordan
General Manager

RWJ:ERFoster:smj

Enclosure

cc/enc: Jim Anzelmo
Robert Blythe
Larry Clark DOE-ORO
Kathy Easter
Eric Foster
Greg Fout
Sandy Fout
Greg Goslow
Mike Hopkins, OEPA-CO/DAPC
Charles Ladd
Pam Lauderback
William E Murphie, DOE-LEX
Mike Murphy, USEPA-Region 5
Pam Potter
Angie Strickland
Steve Toelle, USEC-HQ
Russ Vranicar, DOE-PORTS
Bruce Weinberg, OEPA-SEDO/DAPC
Records Management/ESHR - RC
File - POEF-360-08-066

United States Enrichment Corporation (USEC)
Air Emissions Annual Report
Under Subpart H, 40 CFR 61.94
Calendar Year 2007

Site Name:	Portsmouth Gaseous Diffusion Plant
Operator:	United States Enrichment Corporation
Address:	Post Office Box 628, Mail Stop 9030 3930 U.S. Route 23 South Piketon, Ohio 45661
Contact:	Pamela J Potter
Phone:	(740) 897-4051
Owner:	U.S. Department of Energy

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SECTION 1.0 FACILITY INFORMATION

The Portsmouth Gaseous Diffusion Plant (PORTS) is owned by the Department of Energy (DOE). PORTS was operated by DOE until July 1, 1993. In 1992, Congress passed legislation amending the Atomic Energy Act of 1954 (the Act) to create the United States Enrichment Corporation (USEC), a government-owned corporation, to operate the uranium enrichment enterprise in the United States. The corporation began operation on July 1, 1993. In accordance with the Act, USEC leased the production facilities at PORTS and its sister plant at Paducah, Kentucky from DOE. DOE retained operational control of most waste storage and handling facilities as well as all sites undergoing environmental restoration. In keeping with the Act, on July 28, 1998, the U.S. Department of the Treasury sold the uranium enrichment enterprise through an Initial Public Offering to create USEC, Inc. The original corporation, USEC, became a wholly owned subsidiary of USEC, Inc and continues to operate/maintain the two uranium enrichment plants.

In May 2001, USEC ceased uranium enrichment operations at PORTS. USEC continues to operate transfer facilities and certain support facilities at PORTS for the purpose of removing technetium from off-specification uranium hexafluoride (UF_6) feed material. USEC also continues to remove uranium deposits from the enrichment cascade under contract to DOE. In addition, a separate division of USEC, Inc is installing and operating the Lead Cascade of the American Centrifuge Plant in existing buildings at PORTS. USEC, Inc has recently received an NRC License for a follow-on commercial American Centrifuge Plant in the same location.

The management of the new centrifuge facility is separate from the management of the older enrichment facility. For this reason, the senior corporate officials for both facilities are certifying this report for their own respective activities.

The management of the DOE activities is completely separate from the USEC activities. For this reason, DOE submits its own annual report. Both reports include the public dose from both sets of activities, in accordance with USEPA guidance.

1.1 Site Description

The PORTS site is located in sparsely populated, rural Pike County, Ohio, on a 16.2-km^2 (6.3-mile^2) site about 1.6 km (1 mile) east of the Scioto River Valley at an elevation of approximately 36.6 m (120 ft) above the Scioto River floodplain. The terrain surrounding the plant, except for the Scioto River floodplain, consists of marginal farmland and densely forested hills. The Scioto River floodplain is farmed extensively, particularly with grain crops such as corn and soybeans.

Pike County has a generally moderate climate. Winters in Pike County are moderately cold, and summers are moderately warm and humid. The precipitation is usually well distributed with fall being the driest season. Prevailing winds at the site are out of the southwest to south. Average wind speeds are about 5 mph (8 km/h) although winds of up to 75 mph (121 km/h) have been recorded at the plantsite. Usually, high winds are associated with thunderstorms that occur in spring and summer. Southern Ohio lies within the Midwestern tornado belt, although no tornados have struck the plantsite to date.

Pike County has approximately 27,695 residents (2000 census data). Scattered rural development is typical; however, the county contains numerous small villages such as Piketon, Wakefield, and Jasper, which lie within a few kilometers of the plant. The county's largest community, Waverly, is about 19 km (12 miles) north of the plantsite and has a population of approximately 4,433 residents. Additional population centers within 80 km (50 miles) of the plant are Portsmouth (population 20,909), Chillicothe (population 21,796), and Jackson (population 6,184). The total population of the area lying within an 80-km (50-mile) radius of the plant is approximately 669,000.

USEC is responsible for the principal site process and support operations. Until May 2001, the principal site process was the separation of uranium isotopes through gaseous diffusion. From then until June 2002, the principal site process was quality control sampling, packaging and shipping of uranium enriched elsewhere. A normal part of the packaging process was the removal of residual technetium-99 (^{99}Tc) with chemical adsorbents. In June 2002, the transfer and sampling operations were consolidated at the Paducah Gaseous Diffusion Plant and the PORTS facilities were dedicated to removing ^{99}Tc from UF_6 feedstock prior to enrichment. In addition, USEC continues to remove UF_6 deposits from some of the enrichment equipment in situ under contract to the DOE.

Support operations include the withdrawal of UF_6 from the deposit removal process, treatment of water for both potable and cooling purposes, steam generation for autoclave operation and heating purposes, decontamination of equipment removed from the process, recovery of uranium from various waste materials, treatment of industrial wastes generated onsite, and laboratory analysis of samples. DOE is responsible for operations such as the X-326 "L-Cage" and its glove box, the X-345 High Assay Sampling Area (HASA), and site remediation activities. Because of the separation of responsibilities, DOE and USEC are submitting separate annual NESHAP reports and are certifying only those activities for which they have direct responsibility. The following section is a description of USEC's emissions sources.

1.2 Source Description

1.2.1 Radionuclides Used at the Facility

As discussed above, the principal site process was the separation of uranium isotopes as UF_6 by the gaseous diffusion process until May 2001. Some of the equipment continues to be operated for deposit removal activities under contract with the DOE. From May 2001 until June 2002, UF_6 enriched in the ^{235}U isotope was received from the Paducah Gaseous Diffusion Plant located in Paducah, Kentucky for quality control sampling, transfer into customer-owned containers and shipment to customers. Since June 2002, unenriched UF_6 from both the Paducah and PORTS stockpiles has been sampled, processed to remove ^{99}Tc contamination, and re-packaged. Some of the UF_6 stockpiles owned by both USEC, Inc and DOE contain trace quantities of other radionuclides introduced from DOE's practice during the years 1953 to 1975 of intermittently feeding reprocessed reactor fuel from government reactors in addition to unused UF_6. In particular, concentrations of ^{99}Tc in this material exceed the current ASTM standard for nuclear fuel. PORTS is using chemical adsorbents to remove the ^{99}Tc from liquid UF_6. PORTS has also detected occasional traces of various thorium isotopes, mostly commonly ^{230}Th, in some of the older UF_6.

In October 2006, USEC, Inc introduced UF_6 to the American Centrifuge Lead Cascade. This is a pilot plant and demonstration facility for a new centrifuge-based enrichment plant to be built on the site of, and re-using the infrastructure of, DOE's cancelled Gas Centrifuge Enrichment Plant (GCEP). The Lead Cascade will operate for up to five years on total recycle to generate process operating and economic data and is limited by its NRC License to a total of 250 kg of UF_6 in the entire system. Both the Lead Cascade and the follow-on commercial plant will use feedstock that complies with the ASTM standard for UF_6 feedstock, so no detectable levels of other radionuclides in their emissions are anticipated.

PORTS also uses a variety of sealed sources for calibration of equipment; however, none of this results in material releases and therefore is not used in the determination of the effective dose equivalent (EDE). Column 1 of Table 2.3 lists the radionuclides used in the determination of the EDE.

1.2.2 Monitored and Unmonitored Sources

Table 1.0 PORTS Monitored Emission Points

Location	Vent Identification Number
X-326 Top Purge Vent	X-326-P-2799
X-326 Side Purge Vent	X-326-P-2798
X-326 Emergency Jet Vent	X-326-P-616
X-326 Seal Exhaust Vent 6	X-326-A-540
X-326 Seal Exhaust Vent 5	X-326-A-528
X-326 Seal Exhaust Vent 4	X-326-A-512
X-330 Seal Exhaust Vent 3	X-330-A-279
X-330 Seal Exhaust Vent 2	X-330-A-262
X-333 Seal Exhaust Vent 1	X-333-A-851
X-330 Cold Recovery/Building Wet Air Evacuation Vent	X-330-A-272
X-333 Cold Recovery Vent	X-333-P-852
X-333 Building Wet Air Evacuation Vent	X-333-P-856
X-343 Cold Trap Vent	X-343-P-468
X-344 Gulper Vent	X-344-P-929
X-344 Cold Trap Vent	X-344-P-469
X-3001 North Purge Vacuum/Evacuation Vacuum Vent	X-3001-A-3111

PORTS has reviewed the radiological emission sources on the plantsite and determined that sixteen had the greatest potential for emissions and equipped them with continuous emissions samplers (see Table 1.0 above). All sixteen monitored sources are sampled continuously when operating by flow-proportional, isokinetic samplers to provide emissions data. Six of these sources (the purge cascades, the cold recovery systems, and the building wet air evacuation systems) are also monitored in real-time by ionization chamber instruments for operational control. Three of these sources (the X-343 and X-344 cold trap vents and the X-3001 PV/EV vent) are monitored in real-time by gamma detectors mounted on the continuous emission samplers for the same purpose. Laboratory analysis of the emissions samples is more sensitive, more accurate, and more reliable than either the ionization chambers or the gamma detectors but cannot provide real-time data required for process control.

1.2.2.1 Monitored Sources

Gaseous Diffusion Plant

Top and Side Purge Cascades

The two purge cascades continuously separate light gases from process gas (UF_6) using gaseous diffusion. The separated process gas is returned to the operating cascade cells from the purge cascade. The light gases are split at the head of the purge cascades with enough "lights" being recycled to maintain normal operating flows and the balance being vented through chemical adsorbent traps to the atmosphere. For operational control, each of the two purge cascades is monitored separately with real-time instruments called "space recorders".

Operation of the purge cascade(s) is required for continued operation of the main process cascade. Consequently, the two purge cascades are exhausted by three interconnected air jet eductors. The third eductor (the E-Jet) is an operating spare for either or both regular eductors. The eductors are interconnected to a set of four exhaust pipes. The pipes extend up a 50-meter freestanding tower to remove the emissions from the X-326 Process Building's wind wake. For compliance purposes, each of the three eductors is fitted with separate continuous samplers.

The Top Purge Cascade continues to operate to support the in-situ deposit removal activities mentioned above. The Side Purge Cascade is in standby with its associated eductor valved off. The E-Jet has continued to operate as needed, but has been needed only occasionally since May 2002 and only twice in 2007. Both purge cascades and all three eductors remain available for use if needed.

Seal Exhaust Stations

The seal exhaust (SE) stations maintain a vacuum within cascade compressor shaft seals to prevent inleakage of wet air to the cascade. This vacuum is isolated from the compressor side of the seal by a buffer zone. Gases evacuated from the seals are pulled through chemical adsorbent traps by a bank of manifolded vacuum pumps and exhausted to the atmosphere through mist eliminators (for pump oil) and a roof vent. There is one seal exhaust station in each of the cascade's six "process areas", each being located adjacent to the area control room (ACR).

Two of the seal exhaust stations (Areas 1 and 2) have been shut down. The rest of the seal exhaust stations continue to operate to support the in-situ deposit removal activities. All of the seal exhaust stations are available for use if needed.

Cold Recovery Systems

The cold recovery systems are intermittently operated maintenance support systems used to prepare cascade equipment (e.g., cells) for internal maintenance. Process gas in cascade cells scheduled for maintenance is first evacuated to adjacent cascade cells to the extent practical. The cell is then isolated and alternately purged with dry nitrogen and evacuated to the Cold Recovery System. The evacuated gases pass through chilled vessels called "cold traps" to solidify any residual process gas. The non-condensable nitrogen carrier is passed through chemical adsorbents for polishing and then is vented to the atmosphere. Periodically, individual cold traps are valved off from the vent, and the trapped UF_6 is returned to the cascade by vaporization. There are two cold recovery systems operated at PORTS with one each in the X-330 and X-333 Process Buildings. In X-330, the cold recovery system shares a common vent and vent sampler with the building wet air evacuation system.

Only the X-330 Cold Recovery System continues to operate to support the in-situ deposit removal activities. Both of the Cold Recovery Systems are available for use if needed.

Building Wet Air Evacuation Systems

The building wet air evacuation systems are intermittently operated maintenance support systems used to prepare off-line cascade cells for return to service. The cell is alternately purged with dry nitrogen and evacuated to remove air and moisture from the cell. The evacuated gases are passed through chemical adsorbents to catch residual radionuclides (if any) and vented to the atmosphere. There are two building wet air evacuation systems, one associated with each of the cold recovery systems described above. In X-330, the cold recovery and building wet air evacuation systems share a common vent and sampler.

Only the X-330 Building Wet Air Evacuation System continues to operate to support the in-situ deposit removal activities. This system shares a common vent with the X-330 Cold Recovery System. Both of the Building Wet Air Evacuation Systems are available for use if needed.

X-343 and X-344 Cold Trap Areas

Under PORTS' historic configuration, autoclaves in the X-343 facility vaporized UF_6 in 14-ton cylinders to provide feed material for the enrichment cascade. Autoclaves in the X-344 facility liquefied enriched UF_6 in 14-ton or 10-ton cylinders for quality control sampling and transfer to 2.5-ton cylinders for shipment to customers. Residual gases evacuated from the autoclave process piping were returned to the cascade.

When enrichment operations ceased in 2001, the X-343 and X-344 facilities became the sampling and packaging facilities for UF_6 enriched at the Paducah GDP. This process also included draining the liquid UF_6 through chemical adsorbents to remove residual ^{99}Tc. In June 2002, all enriched material handling was consolidated at the Paducah GDP and the X-343 and X-344 facilities were dedicated to removing ^{99}Tc from out-of-specification UF_6 feedstock before it is enriched at the Paducah GDP. This operation continued through 2007.

A second routine part of the sampling and packaging operation was the replacement and testing of damaged or otherwise out-of-specification valves on the UF_6 cylinders. As the ^{99}Tc removal project has progressed, the number of valves needing replacement has increased and the X-343 was also used to replace and test cylinder valves since July 2004.

To deal with the residual gases without an operating enrichment cascade, cold trap systems similar to those in the cascade cold recovery areas were refurbished and upgraded in both facilities. (The cold trap systems were part of the original design of both facilities, but were taken out of service after the piping evacuation systems were redirected back to the cascade.) As part of the upgrades, both systems received new continuous vent samplers based on the continuous vent samplers used on other vents at PORTS. The new samplers are equipped with radiation monitors to track the accumulation of radioactive material in the sampler traps in real-time. This replaces the 1950's-style "space recorders" used for operational control of older monitored vents at PORTS.

X-344A Manifold Evacuation/Gulper

The X-344A UF_6 Sampling Building contains a sampling and transfer system for sampling the product and for filling customer cylinders with low assay UF_6. The term "assay" refers to the concentration of ^{235}U in weight percent. To avoid cross contamination between samples and to prevent emissions to the air, the sampling and transfer manifold was formerly evacuated back to the diffusion cascade through a line to the X-342 Feed Vaporization and Fluorine Generation Building and, since May 2001, to the X-344 Cold Trap System. In the event of a trace release occurring in spite of the purge and evacuation procedure, a "gulper" is mounted behind the manifold-to-cylinder connections. The gulper is simply a continuous vacuum nozzle, similar in principal to a lab hood, which draws any small releases from the room air into a filtration system. The filtration system has two filter banks, each consisting of a roughing filter followed by high efficiency particulate air (HEPA) filters and a centrifugal blower.

American Centrifuge Lead Cascade

In February 2003, USEC, Inc. submitted a license application to the NRC to build and operate an American Centrifuge Lead Cascade at PORTS. NRC issued the license in March 2004 and UF6 was introduced into the system in October, 2006. The Lead Cascade is installed in the existing X-3001 Process Building and uses the existing building vent.

The Lead Cascade is a demonstration facility licensed for up to 240 individual centrifuges and up to 250 Kg of UF_6. The purpose of the Lead Cascade is to generate operability and economic data for a follow-on commercial centrifuge facility. The Lead Cascade operates on full recycle with no UF_6 being withdrawn except samples for laboratory analysis. The Lead Cascade has only one process vent, the X-3301 North Purge Vacuum/Evacuation Vacuum (PV/EV) Vent.

X-3001 North Purge Vacuum/Evacuation Vacuum

The X-3001 Process Building is one of two process buildings constructed for DOE's Gas Centrifuge Enrichment Plant in the 1980's. USEC has installed the American Centrifuge Lead Cascade, a demonstration and pilot plant for a new gas centrifuge-based uranium enrichment plant, in the north end of X-3001. The PV/EV Vent is the only radiological vent associated with the Lead Cascade. The high-speed centrifuges in the Lead Cascade operate within a vacuum to eliminate gas friction and heating effects. The PV/EV systems exhaust light gases (e.g., air) from within the centrifuge's outer casing. The EV System is a high flow system used to evacuate new centrifuges prior to start-up. The PV system is a low flow system used to continuously evacuate operating centrifuge casings. Each of the four PV/EV vents serves half of a process building and the X-3001 North PV/EV vent is the only one in service. Gases evacuated by the PV/EV Systems are pulled through chemical adsorbent traps by manifolded vacuum pumps and exhausted to the atmosphere through a monitored roof vent similar to the seal exhaust systems in the GDP. The vent monitor is based on the monitors used on the X-343 and X-344 Cold Trap vents.

1.2.2.2 Unmonitored and Potential Sources

PORTS has several unmonitored minor and potential emission sources associated with USEC process support activities. Based on process knowledge and historical ambient monitoring data, none of these sources are believed to contribute significantly (i.e. in excess of 1% of the USEPA standard) to plant radionuclide emissions under normal operations.

The minor sources, as the term is used at PORTS, may have some trace radionuclides in their routine emissions but only in negligible amounts under normal operating conditions. The potential sources are primarily room ventilation exhausts and/or pressure relief vents from areas that have a potential for an internal radionuclide release.

Since 1995, PORTS has included emissions estimates from unmonitored sources in the calculation of the EDE. As required by NESHAP regulations, these estimates were updated based on 2000 and 2005 operational levels. The estimates are based on the methodology in Appendix D of 40 CFR 61.

X-705 Decontamination Facility

Equipment that is removed from the PORTS cascade is covered at the point of removal and transported to the X-705 Decontamination Facility. Small parts may be cleaned in hand tables, while large parts may be sent through an automated tunnel. The hand tables consist of shallow acid baths where metal parts can be decontaminated by passive soaking. The hand tables have fume hoods over them to protect workers from acid fumes. Pressure relief vents are standard on such equipment. The tunnel is an enclosed series of "booths" that can decontaminate large parts by spraying with decontamination solutions as a small dolly carries the parts through the tunnel. The tunnel is ventilated to prevent a buildup of acid fumes. In all cases, radionuclides (uranium and technetium) are dissolved in the liquid phase and collected for recovery of the uranium. None of the radionuclides are volatilized through normal operation of these facilities and only trace radionuclides carried by entrained droplets would be expected.

Most of the X-705 Decontamination Facility has seen limited or no use since the end of enrichment operations, but is still available for use. Consequently, USEC continues to include the estimated emissions in its source term.

X-705 Calciners

Solutions are processed in the Uranium Recovery Area to yield a concentrated uranyl nitrate solution, which is converted into uranium oxide powder in one of two calciners located in X-705. A calciner consists of an inclined heated tube with the uranyl nitrate solution entering at the top and air entering at the bottom. The uranium is first dried and then oxidized as it passes down the tube. The uranium oxide powder is collected directly into a five-inch diameter storage can at the lower end of the calciner tube. The gaseous stream leaves the upper end of the calciner and is exhausted through a scrubber for NO_x control. Uranium is recovered from the spent scrubber solution through a microfiltration process and the effluent is discharged to a National Pollutant Discharge Elimination System permitted outfall. Turbulence and flow rates through the calciners are controlled to minimize blowback of the uranium oxide. Any blowback that does occur is entrapped by the entering uranium solution.

The calciners have seen minimal use since the end of enrichment operations, but do operate occasionally. Consequently, USEC continues to include the estimated emissions in its source term.

X-705 Glove Boxes

The five-inch can that collects the uranium oxide powder from each calciner is housed in a glove box to prevent the loss of the material. In addition, there is a separate glove box which is used for sampling the material in the can. The glove boxes have air locks for the entry and removal of work materials and are maintained under negative pressure during use. This negative pressure is produced by an exhaust fan drawing through a HEPA filter.

Like the calciners, the gloveboxes have seen minimal use since the end of enrichment operations, but do operate occasionally. Consequently, USEC continues to include the estimated emissions in its source term.

X-705 Storage Tank Vents

Uranium-bearing solutions awaiting treatment are stored in five-inch diameter tanks inside the X-705 facility. All of these tanks are manifolded to a common pressure relief vent that has some potential to release radionuclides if the tanks are overfilled or overheated. Normal emissions should be zero since the stored liquids are quiescent, the dissolved radionuclides are non-volatile, and the vents are not open except during filling.

The storage tanks are in routine use, albeit with a very low thruput compared to historical levels. Consequently, emissions estimates from the storage tanks in the X-705 Decontamination Facility are included in the EDE calculations.

Laboratory Fume Hoods

Laboratory analysis of process and other samples is performed in the PORTS on-site laboratory in accordance with standard laboratory practices. There are no emissions controls on the lab hoods used in these procedures. The hoods should not exhibit any measurable radionuclide emissions during normal operation. Small amounts of technetium are partially volatilized by the analytical method approved by the Environmental Protection Agency under the Safe Drinking Water Act. There is also a possibility of a UF_6 sample container bursting during processing. This is an extremely rare occurrence, however, and cannot be regarded as normal operation as specified in the NESHAP regulations. Most laboratory fume hoods are located in the X-710 Laboratory. There are two fume hoods in the X-760 Chemical Engineering Building which operates as an adjunct to the X-710 Laboratory. These hoods were formerly used to prepare environmental samples such as soil, water, air, and vegetation samples for analysis in the X-710 Laboratory. The level of radionuclides in these samples is extremely low as evidenced by the analytical results. The X-705 Decontamination Facility also has a small laboratory which contains three fume hoods which were used to prepare samples and analyze materials being processed in the building. This laboratory has been out of service for several years.

The X-710 Laboratory is in routine use. Consequently, emission estimates were included in the source term for the dose modeling using CAP88. The emissions from the X-710 were modeled as a single source.

XT-847 Glove Box

The XT-847 Glove Box is a large stainless steel glove box which is used to batch small quantities of radioactively contaminated waste for more efficient and less costly storage, shipment, and disposal. The primary waste stream involved is spent alumina and other adsorbents used in control traps on process vents. When the adsorbent is removed from use, it is placed in a safe geometry container (5", 8" or 12" diameter, depending on assay). The material is then analyzed, and if the uranium content meets nuclear criticality safety limits, it is batched into larger containers including, but not limited to, 55 gallon drums. Other radiological materials may also be handled in the glove box. The XT-847 Glovebox exhausts through a HEPA filter and is in routine use.

Room Air Exhausts

Several uranium handling areas within the plant buildings have some potential for releasing minute ($\leq$1 gram) amounts of UF_6 into the room air. Releases of this size are characterized as small releases (visually resembling a puff of cigarette smoke). However, it should not be implied that any size release is acceptable or overlooked by PORTS. Studies conducted in the early 1980s demonstrated that a release of one gram of UF_6 produces a much larger smoke cloud than what is normally observed during the operations discussed here. Ventilation exhausts from, and worker protection within these areas, are controlled according to the probability of releases occurring. Standard policy in the event of a release is to evacuate the area and remotely close down the local ventilation for confinement and subsequent decontamination.

Material feed and withdrawal areas occasionally have small releases when disconnecting UF_6 containers from process piping. These areas include the X-342A Feed and Fluorine Generation Facility, the X-343 Feed Facility, the X-344A UF_6 Sampling Building, the X-330 Tails Withdrawal Area, the X-333 Low Assay Withdrawal Area, and the X-326 Extended Range Product and X-326 Product Withdrawal Areas. These areas have dedicated ventilation exhausts for worker protection but no emission controls or continuous vent monitors (except at the X-344A UF_6 Sampling Building). The plant's Health Physics (HP) personnel sample the air inside these areas for worker protection. The HP data indicates the average radionuclide concentrations inside the room are equivalent to natural background and, based on this, emissions from the room can be presumed to be environmentally insignificant.

The highest probability of internal releases besides the X-344A Sampling/Transfer Area, which was discussed in the previous section, is in the X-705 Decontamination Facility South Annex. The South Annex was designed as a contained area with a separate HEPA filtered ventilation system where contaminated equipment could be opened and disassembled safely. Normal emissions to the outside air should be negligible, which is consistent with past ambient monitoring performed by the HP personnel. Current operations in the South Annex include changing of UF_6 cylinder valves and the processing of spent technetium filters from the X-344. The filter media (a granular solid) is transferred from the filter itself to small NCS-approved containers by a HEPA filtered vacuum. The X-705 South Annex is in routine service.

The "cell floors" of the process buildings are subject to a lesser potential for unplanned releases when cascade components are being serviced or removed. Special worker protection ventilation systems for the cell floors are not considered necessary for several reasons, including the huge volume of air passing through the general ventilation systems (approximately 4,000 process motors are air-cooled by the general ventilation system) and the lower potential for a release. The cell floor air is sampled by Health Physics personnel. The same results found in the material withdrawal areas are seen on the cell floor. Routine emissions levels from process building ventilation should be equal to natural background levels.

Maintenance Sources

There are several small maintenance sources (e.g., a grit blasting glovebox) in the X-700 Cleaning Building and the X-720 Stores and Maintenance Building that sometimes worked on radioactively contaminated equipment or material in the past. None of these sources still operate on radioactively contaminated materials and are not expected to do so at any time in the future. Since the sources themselves are still present, this report lists them as potential radioactive sources with emission rates of zero.

SECTION 2.0 AIR EMISSIONS DATA

Table 2.0 and Table 2.1 summarize the control device information for each source and give the distance and direction from each source to the nearest resident, school, office or business, and vegetable, meat, and milk-producing farms.

2.1 Radionuclide Emissions from Point Sources

The CAP88 model allows up to six sources to be modeled at one time, but assumes that all sources are located at the origin of the same circular grid. PORTS modeled its emissions as three co-located stacks sited at the actual location of the predominant source, the X-326 Tall Stack, up to 1995. From 1995 through 1997, USEC modeled its emissions from PORTS as nine nominal sources at nine different locations to ensure that the impact of estimated emissions from grouped sources close to the downwind site boundary was not underestimated. This required nine different model runs that had to be combined manually, however.

In 1998, after consultation with USEPA-Region 5, the nine nominal sources were re-grouped into three locations, or source groups. At that time, the source terms from the lesser sources in each group were typically an order of magnitude lower than the source term from the predominant source in that same group. In 2000, a tenth source (the XT-847 Glove Box Exhaust) was added to the list. In 2001, two more sources were added (the Cold Trap Vents in X-343 and X-344). The source groups were also reorganized based on the changing emission levels. In 2006, a thirteenth nominal source was added, the American Centrifuge Lead Cascade in the X-3001 Process Building. This is modeled as a fourth source group because it is physically distant from all three of the existing source groups and will be joined by additional sources as the commercial American Centrifuge Plant is constructed.

Group 1 includes the X-326 Stack, all other X-326 vents, all X-710 Laboratory vents and the XT-847 Glove Box Exhaust; these sources were modeled from the location of the X-326 Stack. Group 2 includes only the two X-344 vents; modeled from the location of X-344 Cold Trap Vent. Group 3 includes the X-330, X-333, X-343, X-700, X-705, and X-720 building vents; modeled from the middle of the X-705 Building. Three of the six buildings in Group 3; X-333, X-700 and X-720; had no active radioactive emission sources during 2007. Group 4 includes only the single Lead Cascade Vent in X-3001.

Table 2.0 Point Sources

Point Source[a]	Control Device	Control Efficiency	Distance in Meters to the Nearest:					
			Resident	School	Office or Business	Farm		
						Milk	Meat	Veg.
X-326 Top Purge, Side Purge & E-jet (Cascades) (3 monitors)[b]	Chemical Adsorbents	0-95%[c]	1370 SE	5000 NNW	1520 SSE	4290 N	1370 E	8660 ENE
X-330 Cold Recovery/Wet Air Evacuation Vent	Cold Traps Chemical Adsorbents	90-95%[d] 0-95%[c]	1690 ESE	3930 NNW	1370 W	3200 N	1520 ESE, W	8380 ENE
X-333 Cold Recovery Vent	Cold Traps Chemical Adsorbents	90-95%[d] 0-95%[c]	1330 ESE	3840 NNW	1860 WSW	2960 N	1230 SE	7890 ENE
X-333 Wet Air Evacuation Vent	Chemical Adsorbents	0-95%[c]	1330 ESE	3840 NNW	1860 WSW	2960 N	1230 SE	7890 ENE
X-326 Seal Exhaust Area 6	Chemical Adsorbents	0-95%[c]	1430 E	4880 NNW	1620 SSE	4180 N	1340 E	8630 ENE
X-326 Seal Exhaust Area 5	Chemical Adsorbents	0-95%[c]	1460 E	4630 NNW	1540 WNW	3940 N	1340 E	5830 ENE
X-326 Seal Exhaust Area 4	Chemical Adsorbents	0-95%[c]	1500 ESE	4420 NNW	1460 WNW	3720 N	1340 E	8470 ENE

See notes on page 16.

Table 2.0 Point Sources, continued

Point Source[a]	Control Device	Control Efficiency	Distance in Meters to the Nearest:					
			Resident	School	Office or Business	Farm		
						Milk	Meat	Veg.
X-330 Seal Exhaust Area 3	Chemical Adsorbents	0-95%[c]	1620 E	4080 NNW	1400 W	3360 N	1430 E	8400 ENE
X-330 Seal Exhaust Area 2	Chemical Adsorbents	0-95%[c]	1725 ESE	3690 NNW	1430 WSW	3020 N	1580 SE, W	8320 ENE
X-333 Seal Exhaust Area 1	Chemical Adsorbents	0-95%[c]	1330 ESE	3840 NNW	1860 WSW	2960 N	1230 SE	7890 ENE
X-343 Cold Trap Vent	Cold Traps Chemical Adsorbents	90-95%[d] 0-95%[c]	1070 ESE	3980 NW	2130 WSW	2980 N	1040 SSE	7620 ENE
X-344A Manifold Evacuation/ Gulper	HEPA Filters	99.97%	1830 ESE	3410 NNW	1460 WSW	2680 N	1830 SSE	8320 ENE
X-344 Cold Trap Vent	Cold Traps Chemical Adsorbents	90-95%[d] 0-95%[c]	1870 ESE	3380 NNW	1440 WSW	2660 N	1860 SSE	8340 ENE
XT-847 Glove Box	HEPA Filters	99.97%	640 SSW	5840 N	980 SE	5150 N	1300 S	9150 ENE

See notes on page 16.

Table 2.0 Point Sources, continued

Point Source[a]	Control Device	Control Efficiency	Distance in Meters to the Nearest:					
			Resident	School	Office or Business	Farm		
						Milk	Meat	Veg.
X-3001 North PV/EV Vent	Chemical Adsorbents	0-95%[c]	1100 W	5110 N	1320 WSW	4450 N	1550 SSE	9270 ENE

See notes on page 16.

Table 2.1 Grouped Sources

Point Source[a]	Control Device	Control Efficiency	Distance in Meters to the Nearest:					
			Resident	School	Office or Business	Farm		
						Milk	Meat	Veg.
X-705 Calciners (3)	Wet Scrubber	75%[e]	1330 ESE	4020 NNW	1800 W	3200 N	1050 ESE	7960 ENE
X-710 Laboratory Fume Hoods (39)	None	N/A	1260 E	4690 NNW	1660 WNW	3930 N	1130 E	8350 ENE
X-705 Decontamination Facility	One area HEPA Others none	99.97% N/A	1330 ESE	4020 NNW	1800 W	3200 N	1050 ESE	7960 ENE
X-705 Storage Tank Vents	None	N/A	1330 ESE	4020 NNW	1800 W	3200 N	1050 ESE	7960 ENE
X-700 Cleaning Building	HEPA Filters	99.97%	1220 ESE	3910 NNW	1910 W	3200 N	930 E	7840 ENE
X-720 Maintenance Facility	None	N/A	1220 E	4250 NNW	1800 W	3430 N	1010 E	7880 ENE
Room Air Exhausts	None	N/A	850 ESE	3410 NNW	1370 W	2680 N	760 SE	7560 ENE

See notes on page 16.

	Notes to Tables in Section 2.0
a	All sources in Table 2.0 have continuous vent monitors except the XT-847 Glove Box.
b	The Top and Side Purge Cascade vent streams pass separately through activated alumina traps. A third line, the Emergency Jet, connects to both lines through block valves. All three lines have continuous samplers. The three vent lines connect to four exhaust pipes that extend above the 50-meter tower. The Top Purge jet is vented directly through one pipe. The Side Purge Jet and Emergency Jet lines are interconnected to the other three pipes.
c	Chemical adsorbents (such as activated alumina and sodium fluoride) are approximately 95 percent effective at concentrations above 1 ppm. Below this concentration, chemical adsorbents have reduced efficiency or no effect. Normal concentrations entering the Purge Cascade Chemical Traps are near or below 1 ppm. The sample traps (which follow the control traps) use activated alumina hydrated to 14 percent moisture content, which is much more effective due to an instantaneous reaction of gaseous UF_6 and ^{99}Tc with the water to form particulate matter.
d	Based on process knowledge, cold traps are estimated to be approximately 90 to 95 percent effective in trapping gaseous UF_6.
e	Scrubber efficiency is estimated to be approximately 75 percent but has not been rigorously measured. Normal emissions from the source are estimated to be negligible compared to monitored sources (<0.001 curies of uranium).

Table 2.2 summarizes the grouping of the modeled sources. The individual source terms of the thirteen modeled sources are provided in Table 2.3 of this report. The physical characteristics of the modeled sources are provided in Table 3.0.

2.2 Radionuclide Emissions from Fugitive and Diffuse Sources

There were no significant emissions of radionuclides from diffuse or fugitive sources at PORTS due to USEC operations.

Table 2.2 Grouping of USEC Vents for Modeling

Source	Consists of	Modeled with Source
1	X-326 Top Purge Vent, Side Purge Vent and Emergency Jet Vent	1
2	X-326 SE 6 Vent, SE 5 Vent, SE 4 Vent and ventilation exhaust	1
3	X-330 Building Cell Evacuation/Cold Recovery Vent, SE 3 Vent, SE 2 Vent and ventilation exhaust	7
4	X-333 Cold Recovery Vent, Building Wet Air Evacuation Vent, SE 1 Vent and ventilation exhaust (inactive)	7
5	X-344 Gulper Vent	5
6	All X-700 vents (inactive)	7
7	All X-705 vents	7
8	All X-710 vents	1
9	All X-720 vents (inactive)	7
10	XT-847 Glove Box Vent	1
11	X-343 Cold Trap Vent	7
12	X-344 Cold Trap Vent	5
13	X-3001 North PV/EV Vent	13